

HELPING AT THE NEST BY YEARLING MISSISSIPPI KITES

by

James W. Parker
Biology Department
University of Maine
Farmington, Maine 04938

and

Mark Ports
Department of Biological Sciences
Fort Hays State University
Hays, Kansas 67601

Abstract

Helping at the nest by a yearling Mississippi Kite (*Ictinia mississippiensis*) was confirmed at 3 nests and strongly indicated at 15 others from nests studied during 1969–79. Helpers incubated, brooded and, most frequently, defended nests. For this species we believe that nest defense is a significant form of helping because predation on nests is a major source of mortality. Circumstantial evidence suggests that helping increases nest success and possibly benefits helpers, but more study is needed.

Introduction

Cooperative breeding is uncommon in raptors (Skutch 1961, Rowley 1976, Wiley 1975, Wegner 1976). It appears regular, in the form of polyandry, in only two species of falconiformes, the Galapagos Hawk (*Buteo galapagoensis*, Vries 1973, Faaborg et al. 1980) and the Harris' Hawk (*Parabuteo unicinctus*, Mader 1975, 1979). Here we present the first evidence of helping at the nest by Mississippi Kites, a locally common, often colonial species undergoing a major population expansion in the United States (Parker and Ogden 1979).

Methods and Study Areas

Ports intermittently observed a nest from a nearby blind for 20 hr from 8 to 26 June, 1976 in Woodland Park, a suburban area in Oklahoma City, Oklahoma. Parker made incidental observations during repeated visits to about 900 Mississippi Kite nests at 55 breeding colonies in western Kansas, Oklahoma and north-central Texas during 1968–73 and 1976–79 (Parker 1974, unpubl. data). Most colonies were in shelterbelts (wind-breaks) or similar vegetation. All or most kites in most colonies were observed simultaneously during flocking, but conclusive identification of 2 or more kites at a nest was made only for 209 nests. Observations (i.e., of nesting behaviors, size and plumage color) and banding experience with kites enabled us to sex adult kites if they were seen repeatedly or together. Adult males are lighter and smaller than females (Sutton 1944, Eisenmann 1963, Brown and Amadon 1968), and although the characters overlap, the two in combination are usually conclusive. Yearlings differ from adults by their barred rectrices and the occasional juvenal contour feathers on the abdomen, breast and wing linings. The sex of yearlings is difficult to determine unless a careful size comparison can be made.

Results

Yearling kites were present at about half the colonies studied by Parker. Although not all yearlings bred, most adults did. Yearlings were present at 52 of the 209 nests where

all kites were identified. A yearling appeared pair bonded to an adult for at least 35 (17%) of the 209 nests. At 2 other nests, a yearling helped an adult pair by incubating, brooding, or defending the nest against potential predators. Observations at 15 other nests suggested a similar alloparental yearling helper.

The kites' behavior at 2 nests with confirmed helpers is of greatest interest. The nest observed by Ports was attended by an adult male, an adult female and a large yearling female. During the first observation period, the 2 adults were perched near the nest and allowed the yearling to approach the nest, arrange nesting material, and incubate one egg for at least 90 min. The yearling incubated 2 eggs for 74 min. during the next observation period 5 days later and then sat alone near the nest for 90 min. Fifteen days later (the fourth observation period), the yearling perched near the nest for a minimum of 3½ hr while the adult female incubated. On one occasion, the adult male replaced the yearling on the nest. The yearling did about 15% of the observed incubation (164 of 1100 min.), the adult female about 84%, and the male very little.

Two adult kites were present during 6 of Parker's 11 visits to another nest in a short, lone black locust (*Robinia pseudoacacia*) about 13 km north of Englewood, Clark Co., Kansas. On 29 June, 1979 during the third visit to the nest, a yearling was frightened from this nest containing one egg and one very small nestling. No adults were present, and the yearling left the nest area as adults sometimes do when disturbed. The yearling was next and last seen near the nest on 6 July when it perched with one adult while the other soared nearby.

At the 15 nests where a helper was suspected, yearlings were often seen with 2 adults. At these nests yearlings were not observed to incubate or brood, but this was probably the result of inadequate observations because yearlings often perched at or near nests, were as disturbed by our presence as were the paired adults, and showed more alarm than other adults nesting nearby in the same colony. Typically the yearlings soared with 2 adults low over us and the nest, occasionally made low passes, and sometimes uttered alarm calls. They did not behave this way when we visited other nearby nests.

In 1971 in a mesquite grove near Jones County, Texas, 2 adults fledged 2 young at a nest where helping could not be confirmed except in terms of nest defense. During our last visit, a yearling was seen at the nest with one full-grown nestling. In 1972, this same nest (probably the same 2 adults based on Parker's experience with reuse of nests by kites) produced 2 fledglings. On 1 August 1972, 2 yearlings and 2 adults were present and all showed equal alarm and defense behavior when the fledglings were approached. Twice later a fledgling was seen flying with one yearling. At no nests, including the preceding, did adult kites show any aggression toward yearlings.

Discussion

Observations by other workers suggest that yearling Mississippi Kites help at nests (Seibel 1971, pers. comm. for Kansas, R. Glinski and R. Ohmart pers. comm. for Arizona). Hardin et al. (1977) observed yearlings with each of 4 breeding pairs of adults in southern Illinois, and S. Evans (pers. comm.) made similar observations at each of 6 active nests in the same population in 1980. Our observations are the first to confirm the existence of helping in the forms of incubation, brooding of nestlings, and nest defense. Whether or not helping is frequent is uncertain, but nest defense was the most observed form of helping by yearlings. Nest defense is frequently important in other species with helpers (Wilson 1975, Lack 1968, Brown 1978). For instance, predation is a major problem for the Florida Scrub Jay (*Aphelocoma coerulescens*), one of the most thoroughly

studied cooperative nesters (Stallcup and Woolfenden 1978, Woolfenden and Fitzpatrick 1978). This also seems true of the Mississippi Kite. Its predators, especially other raptors and large climbing mammals, kill adults on nests as well as many eggs and nestlings (Parker 1974, unpublished data). It is reasonable, then, that increased vigilance and nest defense against nest predators might represent a significant benefit and probably increased nest success. We believe the repeated presence of a yearling kite near a nest of 2 adults can be interpreted as a form of helping when the yearling defends the nest against predators.

In only a few bird species is helping actually shown to increase nest success (Rowley 1965, Woolfenden 1975, Brown 1978). Indeed, this is so for the Harris' Hawk (Mader 1979, 785). Our data, although circumstantial, suggest the same for the Mississippi Kite. Thirteen (72%) of the 18 nests with attendant yearlings raised at least one nestling to fledging age. This is significantly greater ($P < .05$, t-test comparing arcsin transformations of percentages) than a 48% nest success for 396 nests in 1969-1971 (Parker 1974) at which no helpers were detected. A possible bias is that 3 of the 18 were lone nests, and lone kite nests are statistically more successful than nests in colonies (Parker 1974). However, it seems unlikely that this could account for the considerable difference in success rates.

Fry (1972), Woolfenden and Fitzpatrick (1978) and Brown (1978) stressed that helpers may benefit from helping by learning and improving behaviors they will use in the future. Woolfenden (1975) demonstrated the benefits of helping for male Scrub Jay helpers, and Brown (1978) noted that for colonial species there seem to be few selective advantages for helpers except the acquisition of experience in the breeding situation. A helper kite would probably accept a minimal risk for its minor effort compared to the risks experienced by breeding adults, but it might enhance its familiarity with specific nesting and foraging areas, the locations and behaviors of predators, and adaptive responses to predators. Curio et al. (1978) showed that inexperienced European Blackbirds (*Turdus merula*) quickly learned to recognize and mob avian predators after observing mobbing of the predators by experienced blackbirds. This strongly supports the hypothesis that kite helpers benefit from association with breeding adults by observation of the adults' adaptive behaviors.

It is not surprising that the Mississippi Kites in the Great Plains exhibit nest helping because they show many characteristics often associated with group-breeding species (Woolfenden and Fitzpatrick 1978, Brown 1978, Wilson 1975, Fry 1972). They live in stable, small and somewhat isolated units and often forage in groups on patchily-distributed insects. They show relatively little sexual dimorphism (Snyder and Wiley 1976) and have a low reproductive rate coupled with a long life expectancy (Parker 1974). Their sex ratio apparently favors males 1.4 to 1 based on a sample of 120 adult specimens collected from throughout the species' breeding range. The kites' nesting environment is not combining predictable elements, such as abundant nesting habitat, and unpredictable elements, such as local predation rates, the occurrence of storms, and insect food. In general its life history suggests a K-strategy. Clearly, additional detailed study at individual nests is needed before helping by yearling Mississippi Kites can be understood.

We thank W. Mader, J. Faaborg, J. Grier, K. Meyer and N. Snyder for suggestions on early drafts of the manuscript. We also thank Jane and Douglas Parker and a number of students for field assistance. Parker received financial aid from an NSF Traineeship at

the University of Kansas, the State University of NY Research Foundation, the Frank M. Chapman Memorial Fund, the Eastern Bird-Banding Association, the Kansas Academy of Sciences, and the Environmental Resources Center at Fredonia College. The Kansas Fish and Game Commission provided living quarters and other aid.

Literature Cited

- Brown, J. 1978. Avian communal breeding systems. *Ann. Rev. Ecol. Syst.* 9:123-155.
- Brown, L. and D. Amadon. 1968. Eagles, hawks and falcons of the world. Vol. 2. McGraw-Hill, New York.
- Curio, E. U. Ernst and W. Vieth. 1978. The adaptive significance of avian mobbing. II. Cultural transmission of enemy recognition in blackbirds: effectiveness and some constraints. *Z. Tierpsychol.* 48:184-202.
- Eisenmann, E. 1963. Mississippi kite in Argentina; with comments on migration and plumages in the genus *Ictinia*. *Auk* 80:74-77.
- Faaborg, J., Tj de Vries, C. B. Patterson and C. R. Griffin. 1980. Preliminary observations on the occurrence and evolution of polyandry in the Galapagos Hawk (*Buteo galapagoensis*). *Auk* 93:581-590.
- Fry, C. H. 1972. The social organization of Bee-eaters (Meropidae) and cooperative breeding in hot-climate birds. *Ibis* 114:1-14.
- Hardin, M. E., J. W. Hardin and W. D. Klimstra. 1977. Observations of nesting Mississippi kites in southern Illinois. *Trans. Ill. State Acad. Sci.* 70:341-348.
- Lack, D. 1968. Ecological adaptations for breeding in birds. Methuen, London.
- Mader, W. J. 1975. Extra adults at Harris' hawk nests. *Condor* 77:482-485.
- Mader, W. J. 1979. Breeding behavior of a polyandrous trio of Harris' hawks in southern Arizona. *Auk* 96:776-788.
- Parker, J. W. 1974. The breeding biology of the Mississippi kite in the Great Plains. Ph.D. dissertation. Univ. Kansas, Lawrence.
- Parker, J. W. and J. C. Ogden. 1979. The recent history and status of the Mississippi kite. *Amer. Birds* 33:119-129.
- Rowley, I. (Convener). 1976. Cooperative breeding in birds. Symposium No. 10. Proc. 16th Int. Ornithol. Congr. Australian Acad. Science, Canberra.
- Scutch, A. F. 1961. Helpers among birds. *Condor* 63:198-226.
- Seibel, D. 1971. The Mississippi kite. *Ks. Ornithol. Soc. Bull.* 22:6-7.
- Snyder, N. F. R. and J. W. Wiley. 1976. Sexual size dimorphism in hawks and owls of North America. *Ornithol. Monogr.* 20:1-96.
- Stallcup, J. A. and G. E. Woolfenden. 1978. Family status and contributions to breeding by Florida scrub jays. *Animal Behav.* 26:1144-1156.
- Sutton, G. M. 1944. The kites of the genus *Ictinia*. *Wilson Bull.* 56:3-8.
- Vries, Tj. de. 1973. The Galapagos Hawk: an eco-geographical study with special reference to its systematic position. Free University Press, Amsterdam, Netherlands.
- Wegner, W. A. 1976. Extra-parental assistance by male American kestrel. *Wilson Bull.* 88:670.
- Wiley, J. M. 1975. Three adult Red-tailed hawks tending a nest. *Condor* 77:480-482.
- Wilson, E. O. 1975. Sociobiology: The new synthesis. Harvard University Press, Cambridge, MA.
- Woolfenden, G. E. 1975. Florida scrub jay helpers at the nest. *Auk* 92:1-15.
- Woolfenden, G. E. and J. W. Fitzpatrick. 1978. The inheritance of territory in group-breeding birds. *Bioscience* 28:104-108.